

ABSTRACT

**ELECTRONIC DEVICES COMPRISING THIN-FILM TRANSISTORS, AND
THEIR MANUFACTURE**

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This invention relates to the fabrication of thin-film transistors (TFTs) on a substrate (4) such as a glass or insulating polymer substrate for use in an active-matrix liquid-crystal display or other large area electronic device. A method of forming a TFT is described which includes the deposition of a masking layer (8) over a semiconductor film (2) and the removal of portions of the masking layer (8) to form a plurality of holes therethrough of a predetermined size and distribution. The perforated portion (26,28) of the masking layer (8) serves to mask partially the semiconductor film (2) during a dopant implantation step to form a field relief region (20,22) simultaneously with definition of the source and drain regions (16,18).

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[Figure 1C]

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A method of manufacturing an electronic device including a thin film transistor comprises forming a semiconductor film over an insulating substrate; depositing a first masking layer over the semiconductor film and removing portions of it to form a plurality of holes through it that extend substantially perpendicularly from its upper to its lower surface; patterning the first masking layer in a first pattern; depositing a second masking layer over the first masking layer; patterning the second masking layer to define a second pattern that lies within the area of the first pattern; and implanting the semiconductor film using at least the first masking layer as an implantation mask. A portion of the first masking layer that defines at least some of the holes partially masks the implantation such that the implantation defines source and drain regions, an undoped conduction channel between the source and drain regions, and a field-relief region having a lower doping concentration than does the drain region between the conduction channel and the drain region.